The usable leftover one-dimensional cutting stock problem—a priority-in-use heuristic

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Abstract

We consider a one-dimensional cutting stock problem in which the material not used in the cutting patterns, if large enough, is kept for use in the future. Moreover, it is assumed that leftovers should not remain in stock for a long time, hence, such leftovers have priority-in-use compared to standard objects (objects bought by the industry) in stock. A heuristic procedure is proposed for this problem, and its performance is analyzed by solving randomly generated dynamic instances where successive problems are solved in a time horizon. For each period, new demands arise and a new problem is solved on the basis of the information about the stock of the previous periods (remaining standard objects in the stock) and usable leftovers generated during those previous periods. The computational experiments show that the solutions presented by the proposed heuristic are better than the solutions obtained by other heuristics from the literature.

Keywords: cutting stock problems; usable leftovers

1. Introduction

The cutting stock problem consists of cutting a set of pieces available in stock into a set of items, required by customers or for stock, with specified quantities, optimizing a certain objective function. Examples of objective functions include minimizing the total number of objects cut, minimizing waste, minimizing the cost of cutting certain objects, maximizing the profit, minimizing production costs, etc.

Studies on one-dimensional cutting stock problems had a great impulse due to the work of Gilmore and Gomory (1961, 1963). Research involving these problems is important in the